

Please add the following new claims:

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59. (New) A method for removing or reducing the concentration of a nitroaromatic compound in a sample comprising contacting a sample suspected of containing said nitroaromatic compound with one or more hydrogenotrophic bacteria and zero-valent iron, or a device comprising culture medium comprising zero-valent iron.
60. (New) The method in accordance with claim 59, wherein said nitroaromatic compound is trinitrotoluene, RDX, HMX, 2-aminodinitrotoluene, 4-aminodinitrotoluene, or parathion.
61. (New) The method in accordance with claim 59, wherein said nitroaromatic compound is trinitrotoluene, RDX, or HMX.

## REMARKS

### A. Status of the Claims

Claims 1-18, 34-37, 42-54 and 56-58 are pending in the application, and of these, claims 35-37, 46-54 and 56-58 are allowed. Claims 1-18, 34 and 42-45 stand rejected. The specific grounds for rejection, and applicants' response thereto, are set out in detail below.

Claims 1, 9, 34 and 42 have been amended to clarify the nature of the invention. New claims 59-61 have been added. These are substantially the same as original claims 39-41, which were canceled inadvertently. For the Examiner's convenience, a marked copy of the amendments to the claims is provided in Appendix A and a clean copy of the pending claims after amendment is provided in Appendix B.

**B. Claim Rejections under 35 U.S.C. §102(b)**

Claims 1-3, 5-8 and 13-15 stand rejected under §102(b) over Belay *et al.* Belay is said to teach a device comprising zero-valent iron and an autotrophic, hydrogenotrophic bacteria. The device is said to comprise an inlet port and an outlet port with an anaerobic digester having a glass support. Applicants traverse.

To anticipate the claimed invention, a single prior art reference must expressly or inherently disclose each and every element as set forth in the relevant claim or claims. *Verdegaal Brothers, Inc. v. Union Oil Co.*, 814 F.2d 628, 631-33 (Fed. Cir.), *cert denied*, 484 U.S. 827, 108 S. Ct. 95, (1987). If all elements of the claim are met, but only if all elements are met, is the claim expressly anticipated. *Atlas Powder v. Ireco Inc.*, 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999).

A careful reading of claim 1 reveals that the device comprises a composition, which composition comprises two elements – zero-valent iron and one or more autotrophic hydrogenotrophic bacteria. These two elements ***must be part of the same composition***. A review of the device illustrated in Belay *et al.* reveals that the bacteria and metal (*e.g.*, iron) of that device are not in contact, and thus clearly cannot be ***part of the same composition***. As such, Belay *et al.* clearly lacks one of the recited elements of the present claim. In order to make this distinction more clear, applicants have provided a clarifying amendment.

Thus, because Belay does not teach each and every element of the claimed invention, it cannot be held anticipatory. Applicants respectfully request reconsideration and withdrawal of the rejection.

C. Rejections Under 35 U.S.C. §103

A. *Hunt in view of Steffan*

Claims 1, 5, 6, 9-12, 16-18, 34 and 42-45 stand rejected as obvious over Hunt *et al.* in view of Steffan *et al.* Hunt is cited as teaching a device with a reactive barrier acting as a support for zero valence iron and suitable bacteria. Hunt admittedly fail to teach autotrophic, hydrogenotrophic bacteria or use in a water treatment system, which are said to be supplied by Steffan. Applicants traverse.

To establish a *prima facie* case of obvious three criteria must be met: 1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; 2) there must be a reasonable expectation of success; 3) the prior art reference (or references when combined) must teach or suggest **all** the claim limitations. MPEP §2143.03 and *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir.1991). See also MPEP §2143.03, citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Furthermore, that one or more references can be combined or modified is not sufficient to establish obviousness. For example, the Federal Circuit held in *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990), that the mere fact that combination or modification of a reference or references is possible does not establish obviousness of the resultant combination unless the prior art **also suggests** the desirability of the combination, *i.e.*, unless the prior art provides **motivation** to produce the resultant combination. *Mills*, 16 U.S.P.Q.2d at 1432; *see also* MPEP § 2143.01, page 2100-91.

Moreover, the Board of Patent Appeals and Interferences has held that the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by

itself to establish obviousness. *Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (BPAI 1993). Section 2143.01 of the MPEP explains the *Levengood* holding as follows: "A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art' at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references."

Applicants submit that the combination of Hunt with Steffan is improper. First, Steffan does not mention the use of zero-valent iron with its autotrophic, hydrogenotrophic bacteria. Nonetheless, the examiner simply concludes that it would be obvious to combine these distinct references without providing any explanation why one would be motivated to substitute the bacteria of Hunt's system with that of Steffan. As such, the rejection is improper on its face.

Second, even if one were to find a valid reason to combine the two references (which applicants submit will not be found), it is highly questionable whether the bacteria disclosed by Steffan (which are aerobic bacteria) could even survive in Hunt's system (which is predominantly anaerobic), thereby undermining any reasonable expectation of success. Yet again, the examiner has omitted any discussion of a requisite element (likelihood of success) for obviousness.

In sum, the entire rejection is conclusory and unsupported by anything like a proper analysis under §103. Thus, applicants respectfully request reconsideration and withdrawal of the rejection.

**B.     *Belay in view of Semp***

Claim 4 is rejected under U.S.C. 103(a) as being unpatentable over Belay in view of Semp *et al.* Belay is cited as above. Semp is said to teach use of the disclosed bacteria for removing undesirable matter from water. Applicants traverse.

As discussed above, Belay fails to teach each element of the claimed invention, namely, zero-valent iron and one or more autotrophic hydrogenotrophic bacteria as *part of the same composition*. Semp does not cure this defect, and thus, the rejection is improper on its face.

As for the obviousness of mixing the metal in the same composition as the bacteria, applicants submit that there is no reason that one would make such a modification based on Belay and Semp. In the primary reference, the metal is provided in a *separate* chamber. Thus, this constitutes a teaching away from the present invention, which requires combination. In other words, if it was obvious that one should mix the bacteria and zero-valent iron, why would one go to the trouble of segregating the components?

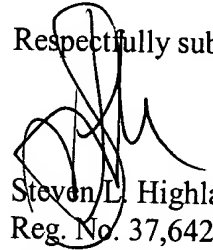
In sum, applicants submit that the rejection over Belay and Semp falls for at least two reasons – failure of the references to set forth each and every element of the claimed invention, and lack of motivation to make the necessary modifications to arrive at the claimed invention. Thus, again, applicants respectfully request reconsideration and withdrawal of the rejection.

V. Conclusion

In light of the foregoing, applicants submit that all claims are in condition for allowance, and an early notification to that effect is earnestly solicited. Should the examiner have any questions regarding this response, a telephone call to the under attorney is respectfully requested.

Please date stamp and return the enclosed postcard as evidence of receipt.

Respectfully submitted,



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Date: June 17, 2003

**APPENDIX A: MARKED COPY OF AMENDED CLAIMS**

1. (Twice amended) A device comprising a composition comprising [zero-valent iron and a culture of] one or more autotrophic hydrogenotrophic bacteria in culture medium comprising zero-valent iron.
9. (Twice amended) A device comprising a composition comprising [zero-valent iron and a culture of] one or more autotrophic hydrogenotrophic bacteria in culture medium comprising zero-valent iron, said device being comprised within an environmental site.
34. (Amended) A method of removing or reducing the concentration of an organic or inorganic compound in an environmental site, comprising providing to said site an effective amount of a composition comprising [zero-valent iron and a culture of] one or more hydrogenotrophic bacteria and zero-valent iron, or contacting said site with a device comprising a composition comprising [zero-valent iron and a] culture [of] medium comprising one or more hydrogenotrophic bacteria and zero-valent iron.
42. (Amended) A method for removing or reducing the concentration of a halocarbon compound in a sample, comprising contacting a sample suspected of containing said halocarbon with a composition comprising [zero-valent iron and a culture of] one or more autotrophic hydrogenotrophic bacteria and zero-valent iron, or contacting said site with a device comprising a composition comprising [zero-valent iron and a] culture [of] medium comprising one or more autotrophic hydrogenotrophic bacteria.
59. (New) A method for removing or reducing the concentration of a nitroaromatic compound in a sample comprising contacting a sample suspected of containing said nitroaromatic compound with one or more hydrogenotrophic bacteria and zero-valent iron, or a device comprising culture medium comprising zero-valent iron.
60. (New) The method in accordance with claim 59, wherein said nitroaromatic compound is trinitrotoluene, RDX, HMX, 2-aminodinitrotoluene, 4-aminodinitrotoluene, or parathion.

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